MCDONNELL DOUGLAS CORPORATION

3/3 Hazardous Waste

29 Apr 85

Mr. Joe Galbraith
Environmental Engineer
Environmental Protection Agency, Region VII
Waste Management Branch
726 Minnesota Avenue
Kansas City, Kansas 66101

Enclosure: (1) Triangle Resource Industries' Proposal for Transport and Disposal of McDonnell Douglas Corporation Waste Materials

Dear Mr. Galbraith:

Please consider this a request for written permission to dispose of materials stored at McDonnell Douglas Corporation (MDC), St. Louis, as described in Enclosure (1).

The enclosure explains in detail, procedures to be utilized by Triangle Resources,Inc. to ensure safe effective disposal of this material. The information is being provided per our phone conversation of 22 April 85. We believe this information should answer most questions concerning this proposal.

In addition to the numerous precautions listed in the enclosure, MDC will also provide an on-site representative to observe the operation and ensure compliance with EPA/DNR conditions.

As you know, we are most anxious to properly dispose of this material to alleviate a potential hazard. We would greatly appreciate an early review of this proposal to facilitate a timely resolution of this problem.

We appreciate your cooperation in this matter. Should you have any questions or comments, feel free to contact myself or Harold Rehkop (314-234-7716) at anytime.

Sincerely,

Bob Kaatman

R. H. Kaatman
Acting Supervisor
Environmental Compliance
314-232-3319

E.C.: Paul Meiburger, Mo. DNR
James Noles, Triangle Resources, Inc.

PROPOSAL FOR TRANSPORT
AND DISPOSAL OF
MCDONNELL DOUGLAS CORPORATION
WASTE MATERIALS

TABLE OF CONTENTS

McDonnell Douglas Corporation

Waste Explosives Disposal Project

This proposal is based upon the information gathered during investigations and meetings with McDonnell Douglas Corporation over the past several months.

Any questions regarding this proposal can be addressed to:

Mr. James V. Noles
Triangle Resource Industries
P.O. Box 210
Reidsville, North Carolina 27320

Phone inquiries may be made for the following subjects to the persons listed below.

Total Proposal - J.V. Noles	919-342-6106 800-334-5953
Technical Proposal - R.M. McClung	919-342-6107 800-334-5953
Qualification Package - J. Danes	919-342-6108 800-334-5953

SECTION I

EXECUTIVE SUMMARY

This proposal has been prepared in response to an invitation issued by McDonnell Douglas Corporation (MDC) for the disposal of RCRA regulated explosive waste materials in St. Louis, Missouri. The waste consists of various types of components and materials currently being stored at a MDC Facility near Lambert Field. To provide the information requested, the proposal is organized into Technical and Business Sections as follows:

Technical Proposal - This section explains how Triangle Resource Industries (TRI) intends to meet all of the technical work elements outlined in the invitation for proposal. Prior to movement of the materials for disposal, TRI will inspect the packaging containers to assure they meet Department of Transportation standards. MDC materials will then be properly manifested to meet all local, state, and federal regulations for transportation. The waste will be safely transported in TRI vehicles with escorts for added protection. Contingency plans will be prepared for unexpected transportation problems. While located at the disposal site, materials not being prepared for the actual disposal process will be positioned in an area removed from the treatment site. This will provide for added safety and protection from possible accidental ignition or detonation. TRI will maintain protective equipment for multiple levels of safety.

After all wastes are treated, TRI will carefully police the site and remove any debris or materials deposited as a result of our operation. These materials will be disposed of according to the applicable regulations.

Qualifications - This section highlights the specific advantages of choosing TRI to conduct the work related to this project. There are a number of clear reasons why MDC should select us for this assignment:

Qualifications - continued

-Availability of the experienced project team specified in the proposal.

-Working knowledge of the State of Missouri Regulations and requirements.

-Extensive experience with explosive waste handling and disposal.

-Availability of equipment required for the total project.

-The best, in our opinion, quality assurance program in the field of hazardous waste management.

This Section also identifies the key personnel proposed for this project. Relevant aspects of each individual's prior experience is highlighted together with the role they will play in this project. Additionally, enclosed in this Section are summaries of other project experience, and a list of references.

SECTION 2

TECHNICAL PROPOSAL

Introduction

TRI's staff of professionally trained explosives experts have developed a program for effectively handling, transporting, and disposing of pyroforic, explosive, and shock sensitive materials by thermodynamic treatment. This program called TRI's Thermodynamic Treatment Program capitalizes on the inherent thermodynamic properties of the materials to breakdown the compounds by combustion and convert them to molecularly simple compounds having no available toxic characteristics. The program provides a disposal outlet for reactive materials that previously had no legal disposal outlet, either through regulatory limitations or restrictions imposed by treatment and disposal facilities. The program minimizes the risks associated with the disposal of these materials and allows a legal way for generators to remove from their property materials that are inherently dangerous, and reduce the risks to which their employees are exposed. The program was developed and is operated by the Special Projects Section of TRI's Systems and Development Group. In the program's infancy, TRI conducted all material handling and subcontracted the actual detonation service. Today, however, TRI has a team of inhouse explosives experts and the program is, solely, TRI operational.

The materials for which this program is applicable include the complete Alcohol, Tobacco, and Firearms (ATF) list of explosives, as well as many common laboratory chemicals and reagents, that through aging, improper storage, reaction with air or chemicals, etc., become shock sensitive or explosive. Many hospitals, research laboratories, testing laboratories, and other institutions, presently have in their possession, dangerous and potentially explosive materials that should be expeditiously removed from their premises to ensure the safety of employees and property. These materials are frequently present unbeknownst to the facility operators. Many of these materials, when they reach this condition may come under the regulation of the Bureau of Alcohol, Tobacco, and Firearms and must be legally stored in ATF approved magazines. The enormity of the hazards of continuing to store outdated, aged, or partially reacted materials that have become shock sensitive or explosive in containers not meeting ATF specifications can not be overstated. In offering thermodynamic treatment as a means of disposing of pyroforics, explosives, shock sensitives, and to a limited

extent, gas cylinders, TRI can offer the client various services and assurances. The MDC materials consist of approximately 8100 units of various cartridge activated devices, ordinances, and aviation related parts containing varying quantities of Class A, B, and C Explosives. These materials were observed at their storage location and appeared to be properly packaged for shipment to a disposal site. The explosive waste as a group presents a definite hazard and should be safety disposed of as soon as possible. The overall condition of the ordinances and parts containing the explosives was very good and will facilitate their proper movement and legal disposal.

Anticipated Problems -Several potential problems are anticipated. These, and TRI's approach to their resolution are summarized below:

Unexpected Regulatory/Legal Delays - To minimize the potential for this problem to impede the project, Jackie Danes has been included in the project team.. Jackie Danes is the Program Coordinator for TRI Special Projects and will be available to coordinate activities and handle legal and regulatory problems.

Weather Delays - Delays due to inclement weather cannot be directly controlled. Some flexibility does exist in scheduling site work and TRI is confident that the project can be completed on schedule.

Unexpected Site Safety Problems - No extraordinary safety problems are expected requiring safety measures beyond these described in this proposal. TRI has extensive experience in dealing with explosive and shock-sensitive materials.

Site Security Problems - TRI will secure all equipment and site activities while we are on the site with the construction of some barriers and gates.

2.1 Preoperational Phase

2.1.1 Site Preparation Plan

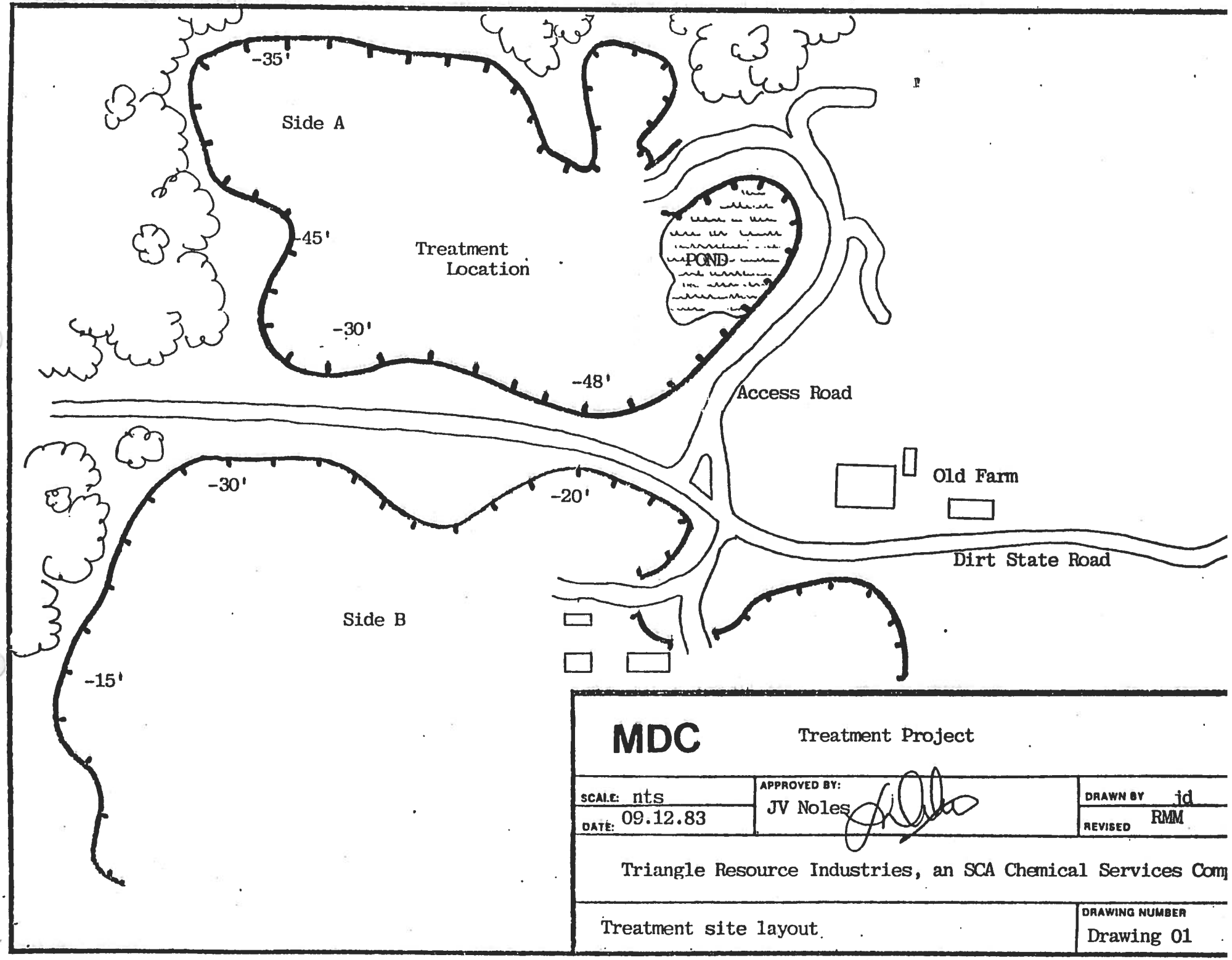
TRI has contracted with Mid-Missouri Limestone Company for the use of their Big Spring Quarry as the treatment site (Drawing I). The quarry is located 12 miles north of Herman, Missouri. The site was inspected by TRI personnel and found to be an excellent location, primarily due to its isolated location and physical layout. A minimal amount of road repairs and site grading will be needed to optimally prepare the final site. The ideal treatment area within the quarry will be adequately depressed (40 ft. below grade) and closely surrounded by secure earthern walls for added protection. During operations, access to the treatment site will be limited to authorized personnel only.

During non-working hours, the MDC materials will be secured in the shipping vehicle, which in turn, will be located within a fence site. Sesmic testing equipment will be set up and operating during all treatment operations. A Resource Conservation and Recovery Act (RCRA) temporary treatment, storage, and disposal (T/S/D) Permit will be secured from state and federal agencies by TRI for this site prior to the commencement of any disposal operations.

2.2 Operational Phase

2.2.1 Waste Materials

Inspection of MDC materials revealed that the only major hazard associated with their handling and disposal was that of a possible uncontrolled explosion. However, close visual examinations by TRI revealed that most materials were in good shape and safe for shipment and ultimate disposal. An inventory of the stored materials revealed the following quantities:



MDC Treatment Project

SCALE: nts	APPROVED BY: JV Noles	DRAWN BY jd
DATE: 09.12.83		REVISED RMM

Triangle Resource Industries, an SCA Chemical Services Com

Treatment site layout	DRAWING NUMBER Drawing 01

Description	Units
Small Arms Ammunition (20 mm & 50 cal)	7,562
Detonating Fuze	193
Explosive Power Device (Class B)	7
(Class C)	199
Hand Signal Device	56
Detonating Fuze (Metal Clad)	106
Explosive Cable Cutter	6
Explosive Release Device	29
Rocket Motor	7
Electric Squibs	8
Actuating Cartridge	42
Jet Thrust Unit	1
Igniter	2
Thermal Battery	12
Total:	8,037

As these explosive components are standard parts of everyday operating high performance aircraft, the only real hazard in their handling is during the disposal phase. TRI understands this hazard and the danger associated with it and will exhibit the utmost care and safety in effectively disposing of the described materials.

2.2.2 Transportation and Handling Procedures

Once the MDC materials are properly manifested and packaged, they will then be hand-loaded on a TRI vehicle and secured for transportation to the final disposal site. The explosives transport vehicle, along with TRI escorts, will follow a pre-determined route during a period when vehicle traffic is minimal. This TRI truck will have all the necessary state and federal permits and will be placarded accordingly. A pre-planned contingency plan will be implemented if any unanticipated problems are encountered during this phase of the operation. Only experienced TRI personnel will be involved in this and future phases of the operation. Operations will only be performed when the proper health and safety equipment are available for possible use.

When the materials arrive at the site, only those quantities being prepared for disposal will be removed from the secured transport vehicles. Handling of this explosive waste will be minimized to help preclude instances of possible danger due to uninitiated detonation.

2.2.3 Treatment Methods

TRI has researched and studied the waste materials produced by MDC and has developed the safest and most efficient methods for treating and disposing of the explosives. It is TRI's intent to perform this operation with the greatest degree of safety and with the best possible results. Past experience in explosives disposal and an acquired knowledge of these materials allows TRI to better handle these explosive components than any other company in the hazardous waste field.

The MDC materials have been separated into three groups for disposal:

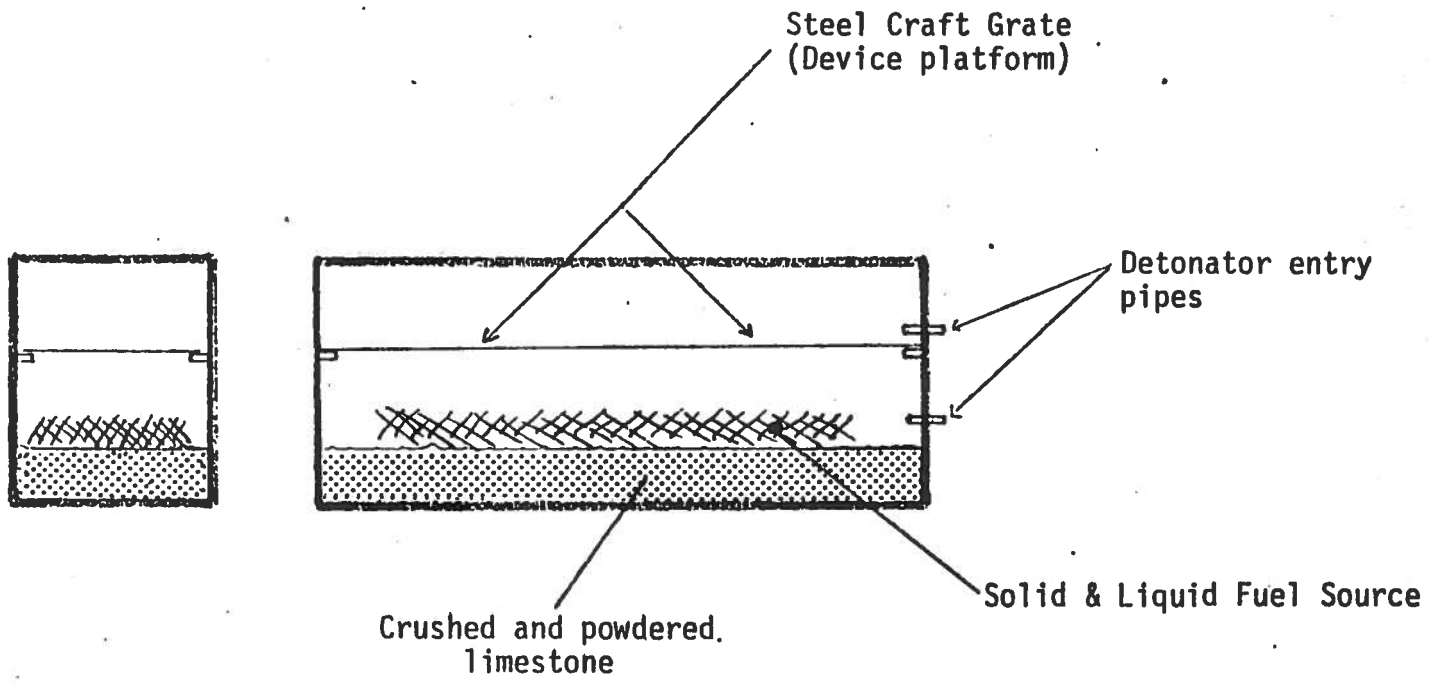
1) Controlled Detonation (Vent and Burn) Materials - Rocket motors and jet thrust units.

2) Thermal Destruction Materials - All other listed materials (except 20 mm shell rounds).

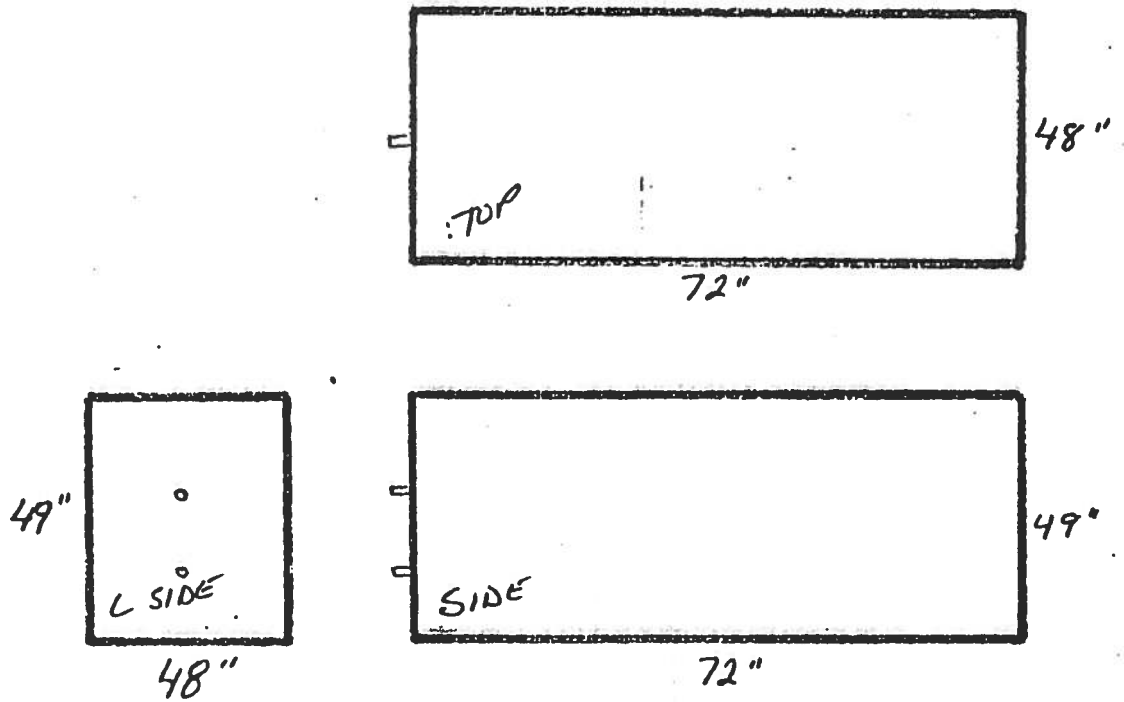
3) Primer Destruction and Thermal Burn Materials - 20 mm shells.

The Group 1 materials are those that typically contain larger quantities of propellant explosives (usually Class B). The particular construction of these units necessitates the opening of the device by detonation and then destroying the explosive by Thermal Destruction. Use of a flex, linear-shaped explosive charge will allow opening of the device without the possibility of uncontrolled rocketing or explosion. Immediately upon opening, the explosive contents will be ignited by a thermal charge and destroyed by incineration. This method has been used successfully in past operations involving similar materials. All of these controlled treatments will be performed in a carefully prepared area for the protection of involved parties against fire and fragmentation.

Materials listed in Group 2 can be effectively destroyed by high-temperature thermal treatment. This will be accomplished by placing selected quantities of these materials within a TRI Burn Box® (Drawing 2) and exposing their contents to temperatures sufficient to destroy the contained explosives by limiting the quantities of materials.



MDC	CAD Treatment Project/ RCRA reactive waste	
SCALE: nts	APPROVED BY:	DRAWN BY rg
DATE: 09.12.83		REVISED RMN
TRIANGLE RESOURCE INDUSTRIES, an SCA Chemical Services Compan		
TRI BURN BOX prototype 4		DRAWING NUMBER Drawing 02



1/8" Rolled steel B
Ena. Paint

.....Prototype 4.....

SYSTEMS & DEVELOPMENT GROUP
Sept. 04 1983

DRAFT
S & D REVIEW O.K.

MDC TREATMENT PROJECT

SCALE: nts	APPROVED BY:	DRAWN BY JJ
DATE: 9-4-83		REVISED
BURN BOX for CAD explosives		DRAWING NUMBER Drawing 02 –

Treated each time, TRI can control the destruction process to assure that all components are destroyed and contained with the Burn Box[R]. This will allow for easy collection of metal and carbon byproducts for containerization and landfill disposal. All materials similar in design will be treated together in numerous stages of this operation.

Group 3 materials will be treated in a modified Burn Box[R] (Drawing 3) which will allow for destruction of ignitating primers prior to thermal destruction of the explosive contents. The electric initiated primers will be destroyed by placing Class C explosive Primacord across the contact surface of the shell casing butt and primer and then detonating the Primacord immediately prior to a thermal charge which destroys the explosive powder in the casings. Again, all debris will be contained in the Burn Box[R] and then containerized for final disposal.

All the procedures detailed in this Section have been performed on past projects and are safe and practical applications for use in disposing of the MDC materials. Research and examination have covered all possible methods and these are best suited for use on this project.

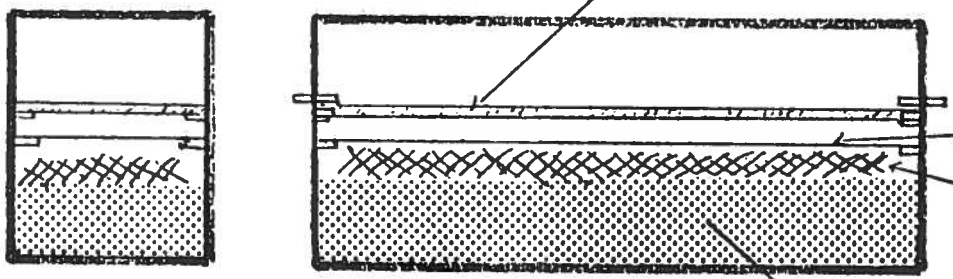
2.2.4 Cleanup Operations

Following each treatment operation, TRI personnel will assure the destruction of <u>each</u> device and its contents. Any components or materials not completely destroyed will be subjected to additional treatment processes. All debris and material produced as a result of TRI operations will be cleaned up, containerized, and removed from the site. The Big Spring Quarry Treatment Site will be returned to its pre-operational condition and this will be assured by Mid-Missouri Limestone Company officials. MDC personnel, as well as any government representatives, will be involved in all operational inspections and requested to provide constructive ideas and comments.

2.3 <u>Technical Operation Plan</u>

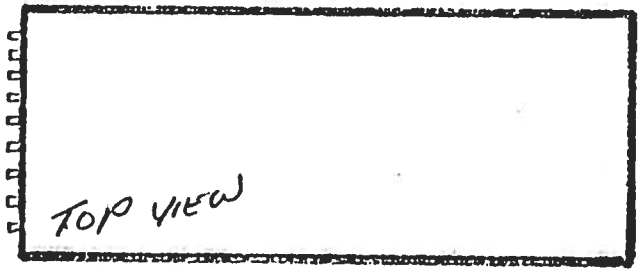
2.3.1 Risk Assessment

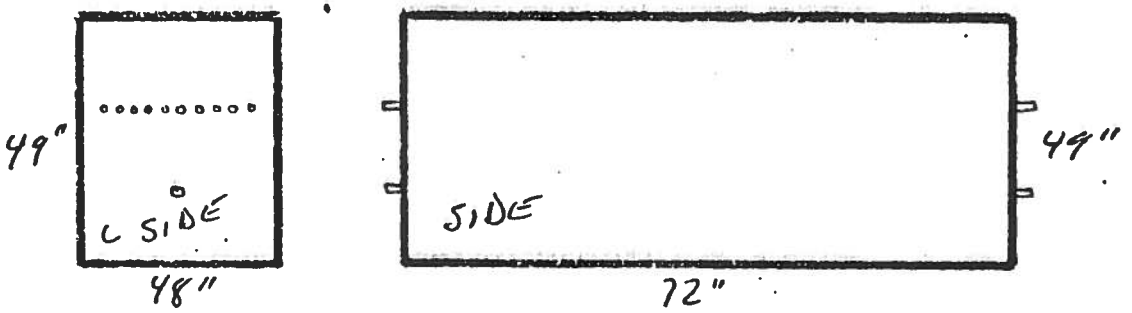
An inventory of stored explosive waste materials represent a real hazard that is dangerous to nearby persons and structures. When combined in the quantities that exist at the MDC site, the risks are multiplied.



MDC	primed ammo TREATMENT PROJECT	
SCALE: nts	APPROVED BY	DRAWN BY rg
DATE: 09.12.83		REVISED RMM
TRIANGLE RESOURCE INDUSTRIES, an SCA Chemical Services Company		
TRI BURN BOX	prototype 5	DRAWING NUMBER Drawing 03

NOTES
Include steel top
and hinge
paint - blue





1/8" Rolled Steel
Burn Box
CAD work

..... Prototype 5.....

SYSTEMS & DEVELOPMENT GROUP
Sept. 04 1983

DRAFT
S & D REVIEW
O/K -

MDC TREATMENT PROJECT

SCALE: NTS	APPROVED BY:	DRAWN BY JC
DATE: 9-4-83		REVISED
BURN BOX	primed projectile ammo	DRAWING NUMBER Drawing 03 -

The characteristics that should be considered include flammability, shock sensitivity, and explosiveness. TRI recognizes the hazards involved in this type of operation and has planned for all possible incidents.

The incidents that must be anticipated from a risk and emergency response stand-point include fires, explosions, and general safety conditions on the site. The most significant risk that exists is associated with the explosive materials that could possibly be ignited and therefore result in a general uncontrolled condition throughout the area. This ignition could occur as a result of the spontaneous ignition of materials from heat or sparks. Such an event would present imminent harm to personnel and equipment on the site.

The TRI Assessment Team estimates that the observed containers are DOT legal for transportation to the off-site location. The handling of these containers will be by TRI personnel using manual methods. Containers will not be moved until the associated risks are evaluated and the proper provisions for final disposal established.

The contingency planning dictated by the project must include the following:

1) First Aid Services will be located on-site and Emergency Medical Services available at an off-site location.
2) Site evacuation planning and third party notification.
3) Routine situational briefings of all on-site personnel on a daily and "significant" conditions basis. This is in followup to the training requirements necessary for these same personnel.
4) Limitation of personnel access to the site during all operations.
5) Safety and health protection for site personnel.
6) Communication briefings with local Civil Defense/Fire/Police/Hospitals, etc. prior to and during site operations, if required.

Preventative measures to avoid the development of an uncontrolled situation will be followed closely. The use of trained and personnel with a knowledge of explosives and experience in similar conditions will be used throughout the operational phases of the project. With these qualifications, any aspect of the operation may be

halted at the direction of the on-site personnel pending assessment of the real-time situation at that point. It is anticipated that the entire operation can be completed without harm to personnel on the site. In the event, however, that such a condition should occur, the affected parties will be familiar with the actions to be taken.

2.3.2 Site Safety and Fire Provisions

The health and safety of all TRI on-site client personnel and state and federal representatives, as well as, the safety of the public and protection of the environment shall be of paramount importance. With this in mind, the general health and safety policies and procedures have been developed and implementation of these guidelines will be by the TRI Project Manager. These policies will take precedence over cost and scheduling of all site project activities. All TRI and MDC personnel, state, and federal representatives and visitors shall abide by these rules.

General Safety Rules

1) Prior to the start of each work day, a morning meeting shall be held for all TRI personnel. These meetings shall review necessary safety procedures, safe work practices, site evacuation and escape procedures, and the planned daily activities.

2) Provisions will be made for first aid for all on-site personnel. At a minimum, a first aid kit will be on-site. The location of the first aid supplies will be posted.

3) An emergency eye wash and deluge shower station will be provided for at active work sites.

4) Fire extinguishers and fire fighting equipment shall be provided for at active locations within the operations area. The fire extinguishers shall be the ABC dry chemical types, minimum 20 lbs. Metal-X powder will be available for Class D fires.

5) All tools and equipment, where necessary, shall be spark proof, explosion proof and/or grounded and bonded.

6) Should site evacuation be necessary, one employee shall be assigned the duty of alerting all personnel on-site. A plan shall be developed for this event and shall be reviewed at morning meetings.

7) Parking of non-essential vehicles outside the designated parking area shall be prohibited since safe egress and ingress areas may be obstructed.

8) All personnel shall use one entrance from the project site. This shall be true with the exception of immediately life and health threatening situations.

9) The Project Manager shall have the authority to remove anyone from the site and prohibit his/her reentry should it be determined that that person threatens site security or the safety of on-site personnel.

Control of Site

Access to the site shall be restricted by a boundary. The only exception to this shall be a life threatening situation.

A log of all contractors, subcontractors, state and federal representatives, and visitors shall be kept.

Fire Protection

Prior to the start of work at the site, all TRI personnel shall be instructed in basic fire safety including the use of hand-held fire extinguishers. Emphasis will be placed on detecting a fire, alerting other personnel with a predetermined alarm, and notifying local fire departments. This information shall be reviewed at morning meetings as necessary.

In the event of fire, it is imperative to prevent its spread. Most fires begin small and can be easily extinguished if discovered early. The greatest single cause of large fires is delayed discovery and/or incompetent action after discovery.

Each TRI person shall be competent in all of the above mentioned areas of fire fighting. Any TRI personnel discovering a fire shall use his voice to alert others while he/she locates the nearest fire extinguishers. Appropriate fire extinguishers shall be located in all active work locations. The second person on the fire shall alert all remaining personnel on site of the fire with a predetermined signal. Persons closest to telephones shall alert the police and local fire departments. Due to the delay in fire departments arriving at the site, all available personnel shall locate appropriate fire extinguishers and aid in containing the fire. If the fire

is extinguished, a garden hose or buckets of water shall be used to cool the area to prevent a buildup of heat and reignition of the area. Water shall not be used on water reactive materials such as combustible materials (e.g., phosphorous compounds).

Water is the most commonly used fire extinguishing agent. Water is usually effective when it is applied in the form of fine droplets or spray. This has a blanketing action effect and avoids the difficulty of impact scattering of lighter material. Water shall be used if all available extinguishing agents are depleted and if it is used as a spray to smother the fire or to cool surrounding areas and already extinguished areas.

Fire extinguishers to be used at the site include dry chemical, CO_2 and MetaL-X in the event of a combustible metal fire. Fire extinguishers shall be located at all active work locations and on all heavy equipment. Inspections of available portable fire extinguishers shall be the responsibility of the Project Manager. Inspections shall be conducted daily.

2.3.3 Preparedness, Contingency and Emergency Plans

The primary goals in designing the site operational procedures, strategies, and work plan are to minimize hazards to human health or the environment from fires without explosions. This goal will be consistent throughout the entire treatment operation.

Prior to any on-site operations, Triangle Resource Industries shall develop Emergency Procedures, Preparedness, and Contingency Plans for the specific operations. The plans will follow the guidelines set forth by TRI policy and will go beyond these guidelines and address possible emergency situations that have the potential to present problems. Topics to be addressed will include, but will not be limited to, emergency telephone numbers, specific response actions for on-the-scene personnel, emergency coordinators, employee training, implementation, and evacuation plans.

Preliminary contacts concerning notification and response services will have been made. In the event of fire, a local fire department will be contacted via mobile radio communications and their fire fighting capabilities enlisted, if needed.

Before on-site operations begin, the TRI personnel will be indoctrinated to the procedures established for the site. Training programs will be

presented and all on-site personnel made aware of emergency procedures, their individual responsibilities, and the health and safety procedures that will be enforced.

2.3.4 Regulatory Interface

Treatment and disposal of MDC materials must be accomplished in compliance with all applicable local, state, and federal regulations covering identification, classificatin, packaging, and labelling. This requires interfacing with regulatory and emergency response agencies involved in the operation.

Federal agencies with authority over hazardous wastes include the Environmental Protection Agency and the Department of Transportation. The state agency responsible for hazardous waste management in Missouri is the Hazardous Waste Management Commission and is the state agency to contact in the event of an incident during operations or transport. One member of the Hazardous Waste Management Commission who may be expected to participate at sometime during the project is David Bedan. TRI has successfully worked with EPA, DOT, and the State of Missouri concerning hazardous waste generation, transportation, and disposal. The latest copy of all applicable Missouri regulations concerning hazardous waste are maintained in TRI's headquarter files and a copy will be maintained by TRI'S on-site personnel.

QUALIFICATIONS

Triangle Resource industries is a service organization specializing in managing hazardous wastes generated by industry, institutions, government agencies and medical or research organizations. TRI offers a complete set of services from routine waste pickups to emergency response to remedial action projects of short or long duration.

Section 3.1 provides information about TRI and its corporate structure. Section 3.2 provides employee resumes to demonstrate the qualifications and experience of some of TRI's project dedicated personnel. Section 3.3, Project Summary Section, describes several explosive projects TRI has completed in the last year and a half.

TRI has assembled a project team with a great deal of experience directly related to the treatment and disposal of explosive material. Our project experience precisely matches the needs of MDC in regard to the explosive components and ordinances.

TRI is proud of its accomplishments in the area of hazardous waste management and cleanup. We encourage MDC to contact the references provided at the end of Section 3.4. These references will provide the best insight into our ability to provide high-quality, professional services on a timely basis. We have provided services for difficult hazardous waste management projects for the State and Federal government and generators of hazardous and explosive waste.

3.1 About Triangle Resource Industries (TRI)

TRI is a wholly owned company of SCA Chemical Services, Inc., a division of SCA Services of Boston, Massachusetts. The acquisition of TRI by SCA occurred in September 1983. Prior to that time, TRI functioned as a division of RAD Services of Pittsburgh, Pennsylvania. TRI operates three RCRA-permitted hazardous waste storage and treatment facilities at the following locations:

Location	Total Square Footage
Reidsville, North Carolina	64,000
Laurel, Maryland	12,000
Greenbrier, Tennessee	60,000

As a company of SCA Chemical Services (SCA), TRI can offer MDC the best disposal options for the explosive wastes. SCA operates six major hazardous waste treatment and disposal facilities located in the eastern half of the United States. These SCA facilities include: a PCB permitted land disposal facility in Model City, New York; two additional secure chemical land disposal facilities at Pinewood, S.C. and Fort Wayne, Indiana; three major liquid hazardous waste treatment facilities in Newark, N.J., Braintree, Mass. and Model City, New York; and the largest commerical hazardous waste incinerator in the United States in Chicago, Illinois.

Section 3.2 EMPLOYEE RESUMES

RESUME

NAME: James V. Noles

EDUCATION:

Military Middle Schools, U.S. Army, USASO
Falls Church High School, Falls Church, Virginia
Northern Virginia College, Loudoun Campus, Virginia
George Mason University, Fairfax County, Virginia
Northern Virginia College, Fairfax Campus, Virginia

Business Law and Administration, PRM
Legal Administration
Wildlife and Forestry Management

EXPERIENCE:

Manager, Systems and Development Group and Special Projects Section
January 1981 to present
Triangle Resource Industries, (RAD Services, Inc.), P.O. Box 370, Laurel, MD 20707

Responsible for research and development of business programs, services, products, and capabilities; management of daily vendor and subcontractor operations; management and direction of systems coordination for all TRI emergency and remedial response actions and special projects including detonations. Consultant Provide company technical guidance, and develop waste handling/disposal procedures. Monitor market trends and concepts and direct company response to the same.

Manager, Administrative Services July 1980 to January 1981
Triangle Resource Industries (RAD Services, Inc.), P. O. Box 370, Laurel, MD 20707

Responsible for the direction and coordination of Divisional Accounting Departments, Purchasing Department, Inventory Control, Retail Program Development, Public Relations, and paralegal services for Triangle Resource Industries.

Divisional Purchasing Officer March 1980 to July 1980
Triangle Resource Industries (RAD Services, Inc.), P. O. Box 370, Laurel, MD 20707

Responsible for purchasing all merchandise, raw commodities, equipment, supplies, and services necessary for operation and safety of the division, and inventory coordination.

Store Manager, Operations Sept. 1977 to March 1980
W.R. Grace & Co., Inc., Retail Group.

Responsible for all store functions including merchandising, replenishment of stock, cash reconciliation and deposit, staff hiring and terminations, customer relations, training, EOE

reporting and enforcement, union relations, and 1976 union negotiations, in addition to overall management of 65 employees.

Store Area Manager — March 1977 to Sept. 1977
W.R. Grace & Co., Inc., Retail Group

Responsible for over-all management of four sports-related departments. Managed areas of budgeting, sales projections, buying, merchandising, display work, and payroll scheduling.

Department Manager, High Adventure — Oct. 1976 to March 1977
W.R. Grace & Co., Inc., Retail Group

Responsible for the sale and merchandising of outdoor sports equipment. Responsible for payroll planning, basic retail training, product seminars, and maintaining skilled sales staff.

Instructor, Mountaineer and Climbing Course Rocks Inc. — Oct. 1972 to April 1976 (part-time and full-time)

Instructed advanced mountaineering and rock climbing.

Ranger Technician — Feb. 1975 to Oct. 1975
Special Park Services, U.S. Dept. of the Interior, National Park Service

Responsible for first aid and emergency rescue operations (River Rescue Team and Rock Rescue Team) for the U.S. National Park Service. Other responsibilities included accident investigation, general patrol, and park mis-use prevention.

MILITARY SERVICE, U.S. MARINE CORPS, Honorable Discharge

TRI SPECIAL PROJECTS:

* Project Manager in the emergency removal of two 20,000 gal tanks of flammable solids and sludge, one incineration tower, one 500 gal tank, and one tanker.
* Project Manager of a Superfund Immediate Removal Action Project. Involved the three day removal/disposal of 250 drums of flammable liquids/solids and contaminated soil.
* Project Manager for detonation jobs resulting in the thermal treatment of over 3,500 lb of various chemical compounds during the past year in three US EPA regions.
* Coordinating consultant on two North Carolina River oil spills contaminating river water, banks, and causing fish kill
* Project Manager for the 6 month clean-up of a major Superfund site in Columbia, SC. Site materials included explosive, shock sensitive, toxic, flammable, and reactive materials and severely deteriorated gas cylinders. Gas cylinders, shock sensitive, and explosive materials were disposed of by detonation.

* Project Director for a Superfund Immediate Removal Action of 4500 cylinders of inert and toxic gases
* Project Manager in the PCB decontamination of a major soft drink manufacturer bottling plant. Project included the monitoring of client personnel for PCB exposure.

WORKSHOPS AND TRAINING PROGRAMS:

July 1978 - Louis A. Allen Management Seminar
April 1979 - Leadership Program and Management Action
April 1979 - Performulations Workshop
June 1979 - Time Management Program, NVCC
May 1980 - Texas A & M, Oil Spill School
Feb. 1981 - TRI Performulations Workshop
Feb. 1983 - DuPont's Professional Training Seminar "Blasting & Explosives Safety"
Feb. 1983 - DuPont's Professional Training Seminar "Surface Blasting"

PUBLICATIONS:

Aug. 1982 - Contributing Author, South Carolina's UPDATE magazine; "Up in Smoke" and "The Dark Side of Chemistry"
Nov. 1982 - Author, Hazardous Waste Report, "Outlook '83"

MEMBERSHIPS:

Society of Explosives Engineers

Certificate of Achievement

This certifies that

JAMES V. NOLES

has successfully completed Du Pont's course

Blasting & Explosives Safety

2.0 Continuing Education Units

Mary E. Wells
Manager of Seminars

FEBRUARY 16-18, 1983
(date)

Professional Training Seminars DUPONT Applied Technology Division

Certificate of Achievement

This certifies that

JAMES V. NOLES

has successfully completed Du Pont's course

Surface Blasting

2.0 Continuing Education Units

Mary E. Wells
Manager of Seminars

FEBRUARY 23-25, 1983
(date)

Professional Training Seminars DUPONT Applied Technology Division

RESUME

NAME: Ronald Michael McClung

EDUCATION:

University of North Carolina, Greensboro, NC
Graduated M.A. Biology: Environmental Biology May, 1981

Glenville State College, Glenville, WV
Graduated B.S. Biology and Chemistry August, 1977

Richwood High School, Richwood WV Graduated June, 1973

EXPERIENCE:

Project Manager, Systems and Development Sept. 1982 to present
Triangle Resource Industries (RAD Services, Inc.), P. O. Box 210, Reidsville, NC 27320

Responsible for actively managing special projects within TRI and helping develop new and innovative programs, and materials handling techniques. Present TRI capabilities to local, state, and federal agencies. Key participant in the thermal treatment/disposal of explosive and shock sensitive materials.

Assistant Project Manager June 1982 to Sept. 1982
Triangle Resource Industries, (RAD Services, Inc.), P. O. Box 210, Reidsville, NC 27320

Performed as assistant project manager for the Bluff Road Chemical Clean-up site near Columbia, SC. Responsibilities included overseeing all areas of drum sampling, drum segregation, bulking of materials, transportation, maintenance of heavy equipment and waste handling supplies, arranging and scheduling subcontractors, scheduling on-site personnel, maintaining waste handling records, and interacting with regulatory agencies.

Chemist Oct. 1981 to June 1982
Triangle Resource Industries (RAD Services, Inc.), P.O. Box 210, Reidsville, NC 27320

Responsible for the identification, manifesting, and packaging of waste materials for educational, government, and industrial clients; requires a thorough knowledge of all EPA and DOT regulations concerning hazardous waste.

Sales Representative and Repair Technician 1979 to 1981
Edleweiss Ski Haus, Greensboro, NC

Worked full-time at these positions while completing Master's degree. Top salesperson during 2+ years of employment.

Construction Supervisor 1977 to 1979
Daniel Construction Company, Greenville, SC

Employed as supervisor of quality control department on hydroelectric project in western Virginia. Responsible for the implementation and adherence of engineering specifications in varying phases of construction, maintaining supervision of ten quality control inspectors and correlated reports on testing results for required meetings.

Research Biologist 1975 to 1976
West Virginia Department of NaturalResources, Charleston, WV

Designed and conducted research with minimal supervision (summers) in fishery and wildlife programs.

TRI SPECIAL PROJECTS:

* Project Manager for the 6 week generator funded clean-up of 3,000 drums of flammable liquids and the excavation of a chemical landfill. Site operations included container sampling, bulking of compatible waste materials with subsequent disposal.
* Assistant Project Manager for the detonation of 3,500 lb of various chemical compounds during the last year in 3 US EPA regions.
* Project Manager for the clean-up of two North Carolina oil river spills. Clean-up included berm and dike construction, oil skimming, contaminated bank vegetation removal, and disposal of all waste materials.
* Assistant Project Manager for the Bluff Road, Columbia, SC Superfund Site.
* Project Manager for the clean-up and decontamination of perchloric acid from a laboratory ventilation system

TRAINING PROGRAMS:

Feb. 1983 - DuPont's Professional Training Seminar "Blasting & Explosives Safety"
Feb. 1983 - DuPont's Professional Training Seminar "Surface Blasting"

PUBLICATIONS:

"Influences of environmental parameters on the adult behavior of Ladonna deplanata and Epitheca cynosura (Odonata)." Master's Thesis, University of North Carolina, Greensboro, 51 pp.

"Thermal selection by an amphisbaenian, Trogonophis wiegmanni." Journal of Thermal Biology 6: 49-51.

"Influences of environmental factors on the adult behavior of Ladonna deplanata (Odonata: Libellulidae)." Oral presentation at Association of Southeastern Biologist, April, 1981. Knoxville, TN.

"Effects of water temperature and food availability on growth patterns of Rainbow Trout." Oral presentation at West Virginia Academy of Science, April, 1977. Salem, WV.

"Sex determination of woodcock by beak length measurements." (Research conducted for WV Department of Natural Resources). Inter-departmental publication.

MEMBERSHIPS:

Who's Who Among American Colleges and Universities
Association of Southeastern Biologists
North Carolina Academy of Science
Chi Beta Phi Science Honor Society
American Chemical Society
Society of Explosives Engineers

Certificate of Achievement

This certifies that

R. MICHAEL McCLUNG

has successfully completed Du Pont's course

Blasting & Explosives Safety

2.0 Continuing Education Units

Mary E. Wells
Manager of Seminars

FEBRUARY 16-18, 1983
(date)

Professional Training Seminars DUPONT Applied Technology Division

Certificate of Achievement

This certifies that

R. M. McCLUNG

has successfully completed Du Pont's course

Surface Blasting

2.0 Continuing Education Units

Mary E. Wells
Manager of Seminars

FEBRUARY 23-25, 1983
(date)

Professional Training Seminars DUPONT Applied Technology Division

RESUME

NAME: Jacquelyn Danes

EDUCATION: Parkdale Senior High School (college-prep courses), 1973
B.S., chemistry, University of Maryland , 1977
Graduate course, Toxicology, USDA, 1978
Multimedia Standard First Aid, American Red Cross

EXPERIENCE:

Program Coordinator 9/82 to present
Triangle Resource Industries, (RAD Services, Inc.), P.O. Box 370, Laurel Md 20707 (Systems & Development Group)

Investigate hazardous waste sites for remedial action by TRI. Write, keyboard, and collate bid proposals for remedial action hazardous waste site clean-ups; prepare and handle bid requests for subcontractors; research disposal options, methods, and regulations; research and maintain competitor files; prepare weekly/monthly reports for incoming waste. Provide support functions for the group. Function as a field health and safety officer and recovery technician. Special Projects team member.

Health and Safety Officer 3/82 to 9/82
Triangle Resource Industries, (RAD Services, Inc.), P.O. Box 370, Laurel, MD 20707
Responsible for maintaining safety standards, issuing appropriate protective clothing, air monitoring, recordkeeping, performing minor first aid and watching for and educating field chemists to signs of heat exhaustion and heat stress. (Monitored field personnel diets to maintain proper electrolyte balances under severe summer South Carolina heat and humidity conditions). Conducted site orientations. Provided general site support duties.

Administrative Assistant 11/81 to 3/82
Triangle Resource Industries, (RAD Services, Inc.), P.O. Box 370, Laurel, MD 20707 (Compliance Programs)

Updated and renewed hazardous waste transporter permits. Maintained personnel and vehicle records. Generated an intracompany newsletter. Participated in special projects.

Editorial Assistant 9/79 to 10/81
American Chemical Society, 16th St., N.W., Washington, D.C. 20036

Worked for Analytical Chemistry, a peer reviewed journal/magazine. Handled production of feature sections and peer review of submitted manuscripts. Edited manuscripts and material for feature sections, worked with developing artwork and layouts, composed correspondence to journal contributors.

Statistical Assistant 8/78 to 12/78
USDA Ruminant Nutrition Lab, Beltsville, MD

Collected, recorded, and performed routine statistical manipulations on data for computer evaluation. Involved maintaining an alertness for irregularities in data, some lab work, and operation of a programmable calculator.

Chemist 11/77 to 8/78
USDA Pesticide Degradation Lab (Beltsville, Maryland).

Contributed to setting up and designing structures and containers for a long range herbicide recovery study. Involved contacting suppliers and machinists and performing rudimentary liquid chemistry procedures.

Laboratory Assistant 2/77 to 6/77
USDA Tobacco Lab, Beltsville, MD

Performed liquid chemistry procedures for spectrophotometric determinations of residual tobacco treatment chemicals. Operated a spectrophotometer. Employed as a participant in a federally funded student program.

Laboratory Assistant 5/74 to 10/74
University of Maryland Laboratory of Chemical Evolution (College Park, Maryland).

Summer employment extending into the following semester. Set up experiments to simulate conditions on the primordial earth, prepared samples for gas chromatographic and amino acid analysis, operated a gas chromatograph, calculated and interpreted gas chromatograms.

TRI SPECIAL PROJECTS:

* Health/Safety Officer and Recovery Technician for a Superfund Immediate Removal Action project involving the removal and disposal of 250 drums of waste flammable solids and liquids and contaminated soil.
* Health/Safety Officer and Field Technician for the Jadco Hughes project
* Health/Safety Officer and Field Technician during the detonation of 3,500 lbs of various chemical compounds during the last year.
* Health/Safety Officer for the Bluff Road Superfund Clean-up Project.

MEMBERSHIPS: American Chemical Society
American Industrial Hygiene Association
University of Maryland Alumni Association

RESUME

NAME: Randall Keith Garner

EDUCATION:

University of North Carolina, Chapel Hill
Graduated B.S. Biology, Chemistry (minor), 1981

EXPERIENCE:

Project Manager, Systems and Development June 1982
Triangle Resource Industries (RAD Services, Inc.), P.O. Box 210, Reidsville, NC 27320

Responsible for actively managing TRI special projects; dealing with newspaper, state and local representatives as related to special projects; and helping to develop new and innovative service programs, waste handling techniques, and capabilities.

Chemist March 1982 to present
Triangle Resource Industries (RAD Services, Inc.), P.O. Box 210, Reidsville, NC 27320

Responsible for identifying, manifesting, and packaging of waste materials for educational, government, and industrial clients; requires a thorough knowledge of all EPA and DOT regulations concerning hazardous waste. Worked as Field Chemist for Bluff Road Clean-up Project.

Furniture Packager 1979 to 1982
Stewarts Furniture Company, Asheboro, NC

Duties included final packaging of furniture, direction and supervision of emloyees in packaging procedures.

Lab Assistant 1977 to 1979
Botany Department, University of North Carolina, Chapel Hill

Responsible for microscope slide preparation, setting up laboratory equipment, and other general lab related work.

TRI SPECIAL PROJECTS:

* Project Manager during removal and disposal of two 20,000 tanks of flammable sludge and solid material, one 500 gal tank of the same, one tanker, and one incineration tower in North Carolina (Jadco Hughes Project)
* Recovery Technician/Manager for a Superfund Immediate Removal Action project involving the removal and disposal of 250 drums of flammable liquids and contaminated soil.

* Field Technician on explosives detonation projects.
* Supervisor for two North Carolina oil river spills
* Field Chemist for Bluff Road Superfund project (Columbia, SC)

ACHIEVEMENTS:

Morehead Scholarship nominee. Held # 1 rank during entire high school term.

3.3 PROJECT SUMMARIES

TRI has met with great success in offering its Thermodynamic Treatment Program to clients having heat and shock sensitive materials to be disposed of. Summaries of several TRI Thermodynamic Treatment Jobs are provided below.

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DATE: July 21, 1983

CLIENT: Georgia Environmental Protection Division

ADDRESS: Land Protection Branch, 270 Washington St., Atlanta, GA 30334

CONTACT: Shirley Maxwell

PHONE: (404) 656-2833

TYPE OF ACTION: Thermodynamic Treatment

MATERIAL DESCRIPTION: Four pounds of dry picric acid and 100 g of 2,4-Dinitrophenylhydrazine required treatment.

STORAGE CONDITIONS: The materials were stored in a laboratory chemical storage cabinet.

HAZARDS: Picric acid is extremely heat and shock sensitive when the water content is less than 10%.

TRI'S ACTIONS: TRI removed the materials to a nearby police firing range, and under the scrutiny of SWAT and Georgia EPA, safely detonated the materials. Fire control measures were taken in the event of a brush fire and air monitoring was conducted prior to and following the treatment process.

DATE: July 15, 1983

CLIENT: United States Environmental Protection Agency (USEPA)

ADDRESS: Research Triangle Park, Durham, NC 27711

CONTACT: Jewell Finch Morris

PHONE: (919) 541-2613

TYPE OF ACTION: Emergency removal, packaging, and thermodynamic treatment of shock sensitive chemicals

MATERIAL DESCRIPTION: Thirty-nine pounds of tetrahydrofuran, butyl ether, diethyl ether, dioxane, and boron trifluoride etherate required treatment.

STORAGE CONDITIONS: The materials were stored in an outdoor refrigerated chemical storage shed.

HAZARDS: Spontaneous combustion and detonation. Several of the diethyl ether containers exhibited corrosion. The condition and age of the chemicals made their continued storage a threat to employees, the storage shelter, and surrounding structures.

TRI'S ACTIONS: TRI was first informed of the existence of these chemicals on August 14, 1983, while performing two other thermodynamic treatment jobs. TRI assisted USEPA is acquiring an emergency treatment permit and the following day TRI packaged the materials, transported them to the permitted disposal facility (local landfill), and treated them. The entire operation required 3.5 hours. Air monitoring, pre- and post-blast, indicated no residual, uncombusted materials. Soil samples were taken prior to and following the detonation.

DATE: August 14, 1983

CLIENT: Monsanto Corporation

ADDRESS: 3025 Cornwallis Road, Research Triangle Park, Durham, NC 27709

CONTACT: Dave Batchelor, Supervisor, Safety Services, Environmental

PHONE: (919) 549-8111

TYPE OF ACTION: Removal and Treatment of Shock Sensitive Materials

MATERIAL DESCRIPTION: A total of 9 lbs of picric acid, 2,4-dinitrophenylhydrazine, dinitrophenol, and various peroxides such as dicumyl peroxide, cumene hydroperoxide, methyl ethyl ketone peroxide, 2,4-dichlorobenzoyl peroxide, and benzoyl peroxide required treatment.

STORAGE CONDITIONS: The materials were located in several labs throughout the Monsanto building. Some of the materials were refrigerated and required temperature control provisions during transport and set-up.

HAZARDS: Spontaneous combustion and detonation

TRI'S ACTIONS: TRI received the necessary permit for the treatment and packaged and transported the materials to the detonation site on Monsanto property. The limited size of the treatment site required the use of TRI's specially constructed "Shock Boxes" for blast containment and increased blast direction control. A series of four detonations, using two "Shock Boxes" each time, achieved complete thermal destruction of the materials. Air monitoring was conducted prior to and following each treatment process.

DATE: August 14, 1983

CLIENT: NIEHS

ADDRESS: P.O. Box Box 12233, Research Triangle Park, NC 27709

CONTACT: Valeria Shropshire

PHONE: (919) 541-3384

TYPE OF ACTION: Thermodynamic Treatment of Shock Sensitive Materials

MATERIAL DESCRIPTION: A total of 47 lbs of the following partial list of chemicals required treatment; benzoyl peroxide, peracetic acid, dinitrophenylhydrazine, butylhydroperoxide, dinitrophenol, chloroperbenzoic acid, picric acid, and diethyl ether.

STORAGE CONDITIONS: All materials were stored in an air conditioned chemical storage area at the NIEHS complex.

HAZARDS: Spontaneous combustion or detonation of the materials.

TRI'S ACTIONS: TRI arranged for the use of non-client property (a landfill) for the treatment process, acquired the necessary permits, and made the appropriate notifications. TRI packaged, manifested, transported, and detonated the materials in an operation that took 5 hours. Present during the treatment operation were North Carolina Department of Human Resource, NIEHS, and landfill representatives.

DATE: May 13, 1983

CLIENT: Old Dominion University (ODU)

ADDRESS: Norfolk, VA

CONTACT: Eric Raudenbush, Radiation and Health Safety Officer

PHONE: (804) 440-4495

TYPE OF ACTION: Emergency Removal and Thermodynamic Treatment of Shock Sensitized Materials

MATERIAL DESCRIPTION: Two 55-gal drums of diethyl, 3 lbs of picric acid, 3 lbs of sodium metal, and more than 5 gal of additional diethyl ether required treatment.

STORAGE CONDITIONS: The two 55-gal drums of diethyl ether were discovered in a storage shed immediately adjacent to the university's stadium. Graduation ceremonies were scheduled to take place in the stadium within two days of the discovery.

HAZARDS: The storage of 100 gal of diethyl ether in an unrefrigerated shed, adjacent to a stadium soon to be filled with people, represented an imminent hazard, as determined by the Virginia State Health Department, Division of Solid and Hazardous Waste Management.

TRI'S ACTIONS: TRI obtained an emergency T/S/D permit on behalf of ODU in two days. TRI manually removed the 55-gal drums of diethyl ether from the shed. A mobile crane, with sling, placed the drums in a dumper trailer, lined with oil-dry to function as a bunker. TRI individually transported the drums to the City of Norfolk landfill for thermodynamic treatment. The smaller quantities of diethyl ether, picric acid, and sodium metal were transported to the same treatment site in TRI's Type 4 explosives magazine. The materials were detonated in two treatment processes. TRI routinely uses minimum hazard explosives to rupture the chemicals' containers and initiate the treatment process. The heavy gauge steel of the 55-gal drums required high explosives (Class A) to rupture the container walls. The city landfill is directly adjacent to the James River. TRI air monitored from the river and patrolled the river, with City of Norfolk Water Patrol, to restrict channel boat traffic from approaching the disposal site at the time of the detonation.

DATE: April, 1983

CLIENT: Louisiana State University (LSU) Medical Center

ADDRESS: 1542 Tulane Street, New Orleans, Louisiana

CONTACT: George Smith, Safety Engineer for the LSU System

PHONE: (504) 388-8839

TYPE OF ACTION: Thermodynamic Treatment of Shock Sensitive Material

MATERIAL DESCRIPTION: Nineteen pounds of the following reactive or potentially explosive materials required treatment: benzoyl peroxide, picric acid, ether anhydrous, 2,4-dinitrophenyl hydrazine, trinitrotoluene, picramide, t-butyl hydroperoxide, hydrazine anhydrous, white phosphorus, sodium metal, and phenyl hydrazine. Many of the containers showed signs of deterioration and some materials had crystallized. Crystallization in these materials is indicative of chemical instability.

STORAGE CONDITIONS: The materials were stored in chemical storage areas.

HAZARDS: Spontaneous detonation.

TRI'S ACTIONS: TRI applied for and received emergency permitting on behalf of LSU, to perform the detonation. This permit process required the involvement of US EPA Region 6 and represented TRI's first emergency permit acquisition in this EPA Region. The materials were packaged during light work shifts at the medical center and transported in TRI's explosives magazine to the prearranged site for destruction. Air monitoring prior and post to the detonation revealed complete destruction of the materials.

DATE: April, 19

CLIENT: Davis Hospital

ADDRESS: Cherry St., Statesville, NC

CONTACT: Ed Green

PHONE:

TYPE OF ACTION: Thermodynamic Treatment of Shock Sensitive Material

MATERIAL DESCRIPTION: Two 4-oz. glass bottles of dry picric acid (2,4,6-trinitrophenol) were discovered in a second floor laboratory (40' X 40') of Davis Hospital. Dry picric acid is an extremely sensitive substance and can detonate upon initiation by shock or at temperatures of 300 ^{o}C.

STORAGE CONDITIONS: The materials were being stored in a cabinet beneath a laboratory sink located in a very active wing of the hospital.

HAZARDS: The eight oz. of dry picric acid contained sufficient energy of combustion to totally destroy the laboratory and any personnel present should the material have been detonated in the laboratory.

TRI'S ACTION: TRI's Special Projects Section arrived at the hospital and safely removed the explosive materials within 45 minutes after arrival. Removal was scheduled between hospital shift changes to minimize risks and inconvenience to hospital personnel resulting from restricted access to the section of the hospital in question. The material was transported from the hospital in TRI's Type 4 Explosives Magazine to a prearranged detonation site owned by Iredell County. Escort service was provided by the City of Statesville's Police Department. Air monitoring was conducted both pre- and post- to the detonation. The setup was completed in 50 minutes and the detonation successfully completed with no adverse environmental effects as evidenced by air monitoring and post detonation site investigation.

DATE: February, 1985

CLIENT: R.J. Reynolds Tobacco Co.

ADDRESS: Reynolds Boulevard, P.O. Box 854, Winston-Salem, NC 27102

CONTACT: Mike Borgerding

PHONE: 919-777-6165

TYPE OF ACTION: Thermodynamic Treatment of Shock Sensitive Material

MATERIAL DESCRIPTION:

STORAGE CONDITIONS: The materials were stored in laboratory cabinets at room temperature or were refrigerated.

HAZARDS: Some of the materials possessed enhanced explosive characteristics as a result of crystal formation of the virgin materials.

TRI'S ACTION: TRI removed the materials early during weekend hours to reduce exposure risks to employees. Employee concentration was at a minimum. TRI took measures to maintain the temperature of the previously refrigerated materials during transport and disposal setup. All materials were removed to the TRI high explosive Type 4 ATF magazine and moved approximately six (6) miles to a remote predetermined disposal area provided by the client. The materials were successfully detonated in a single treatment process.

DATE: January, 1983

CLIENT: Maquire Nuclear Power Facility

ADDRESS: Highway 73, Route 4, Box 531, Huntersville, NC 28078

CONTACT: Pat Wingo, System Environmentalist, Health Sciences Department

PHONE: (704) 875-1971

TYPE OF ACTION: Thermal Detonation Disposal of Shock Sensitive Material

MATERIAL DESCRIPTION Seventeen pounds of shock sensitive diethyl ether, showed signs of peroxide formation.

STORAGE CONDITIONS: The materials were located in two different buildings at the Maguire Nuclear Power Facility near Charlotte.

HAZARDS: The shock sensitive nature of the materials and the evidence of peroxide formation made the continued storage of these materials an imminent hazard to property and personnel.

TRI'S ACTIONS: TRI's Special Projects Section responded by removing the materials to a predesignated disposal site at the Maguire Nuclear Power Facility near Charlotte for thermal destruction by detonation. The 17# of diethyl ether were safely detonated. TRI monitored the air in the area of the detonation prior to and following the detonation, to determine completeness of combustion. The thermodynamic treatment was completely successful, with all materials determined to be destroyed during combustion.

TOTAL JOB TIME: 4 hours

DATE: August, 19[illegible]

CLIENT: Consortium of 10 contributing generators under direct supervision of the South Carolina Department of Health and Environmental Control

ADDRESS: 500 Bull Street, Columbia, SC 29209

CONTACT: Jim Ullery

PHONE: (803) 758-5681

TYPE OF ACTION: Thermodynamic Treatment of Pyroforic, Explosive, and Shock Sensitive Materials

MATERIAL DESCRIPTION: Two 16' X 6" cylinders containing smaller cylinders of pyroforic nickel carbonyl; 120 bottles of laboratory chemicals ranging from peroxided ethers to picric acid, to trinitro-toluene (TNT); 42 gas cylinders containing oxygen, chlorine, trimethyl aluminum, carbon monoxide, fluorine, others, as well as unknowns.

STORAGE CONDITIONS: The materials were located at the abandoned Bluff Road Superfund hazardous waste site, situated 7 miles outside of Columbia, SC. Their disposal was part of a larger scale clean-up involving disposal of 75% of the on-site waste. The materials included laboratory chemicals and gas cylinders and were found in deteriorating drums and on open ground, exposed to the natural elements. Most of the gas cylinders exhibited signs of corrosion along the cylinders and at the valves. Many of the chemicals exhibited signs of peroxide formation (crystal formation, appropriate coloration, etc.)

HAZARDS: The hazards were enormous. A detonation site had to be found that was remote from the hazardous waste disposal site, from heavily traveled roads, and from population centers. The cylinder valves had to be modified to ensure no leakage during transport. Extreme care had to exercised in handling two 16' long cylinders containing the pyroforic material nickel carbonyl. An added degree of hazard was introduced by the unknown identity of some of materials.

TRI'S ACTION: TRI pursued and obtained a DOT exemption that allowed the transportation of unknown gaseous materials. This was preempted by developing an ingenious method of eliminating the possibility of leakage through the valves. TRI safely transported the materials at 2 AM, under escort, a distance of 5.5 miles to the disposal site. Preparation of the ground for the detonation required one day. The materials were transported, setup, and detonated over a 2 day period.

Special penetrating devices were used to vent the gas cylinders. The devices, known as Mark 23 and 3 Cutters are antitank weapons used in military operations to disable tanks. The Cutters were carefully positioned with respect to the cylinders so that maximum velocity of the penetrating device was achieved at each cylinder surface. The set-up was tedious at best, with extreme heat and humidity intensifying work conditions.

3.4 REFERENCES

1) Mr. Willard F. Potter
Waste Disposal Coordinator
Allied Chemical Corporation
P.O. Box 1139 R
Morristown, NJ 07960
201-455-3856

2) Mr. Doug Fitts
ARCO Research & Engineering Center
3801 Westchester Pike
Newtown Square, PA 19073
215-359-2232

3) Mr. Nicholas Davich
Environmental Engineer
Gulf Research & Development Corp.
P.O. Drawer 2038
Pittsburgh, PA 15230
412-665-2837

4) Mr. Bill Mihalco
Westinghouse Corporation
Bettis Atomic Power Labs
West Mifflin, PA 15122
412-462-5000

5) Mr. Jeff Simmons
Contracts Management
U.S. Environmental Protection Agency
Research Triangle Park, NC 27711

6) Mr. William Ware
Purchasing Agent
Uniroyal, Inc.
World Headquarters
Middlebury, CT 06749
203-573-2605

7) Mr. Harry Pierce
The Pennsylvania State University
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University Park, PA 16802
814-685-6391

8) Mr. Ed Trzcinski
Technicon Instruments Corp.
511 Benedict Ave.
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9) Mr. Robert Malpass
Department of Health &
Environmental Control
Bureau of Solid & Hazardous
Waste Management
2600 Bull St.
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10. Tom Karnowski
North Carolina Department
of Human Resources
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P.O. Box 2091
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13. Mike Wright
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14. George Smith
Louisiana State University
Medical Center
1542 Tulane Street
New Orleans, LA 70072
504-388-8839